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ETHIOPIAN CULICIDAE: A DESCRIPTION OF THE LARVA AND PUPA OF *AËDES* (*AËDIMORPHUS*) *MUTILUS* EDWARDS.

By Mrs. E. C. C. van Someren.

(*Division of Insect-Borne Diseases, Medical Research Laboratory, Nairobi, Kenya.*)

The larva described below was collected from ground pools in Bwamba, Toro District, Uganda. The adult male mosquito which emerged from this larva proved to be *A.* (*A.*) *mutilus* Edwards. This and other adults of this species from Bwamba agree with Edwards' (1941) description of *mutilus* except that the style of the male terminalia has little or no indication of a terminal horn.

Aëdes (*Aëdimorphus*) *mutilus* Edwards.

The larva is very like that of *A.* (*A.*) *filicis* I. & De M., but differs by having the last 5, instead of 3, pecten teeth large, simple and widely spaced.

Larva. Head.—Antenna slender, spiculate, curved and pale throughout; tuft just below a half and with about 8 plumose branches. Setae A, B and C with about 9–11, 5 and 7 plumose branches respectively; *d* small and with about 10 branches. Mentum with 20 small teeth on either side of the central tooth. *Abdomen.*—Comb a patch of about 26 broad, pale coloured, coarsely fringed scales. Siphon pale; index 4·9 in crushed specimens; pecten of 15 dark spines, the basal few set close together and each with one coarse and sometimes another very small ventral denticle, the apical 5 spines widely spaced, larger, and simple; subventral tuft with 3 simple branches which are about half the length of the diameter of the siphon, placed well beyond middle and between the last 2 pecten spines. Anal segment with a large, pale, smooth saddle; lateral seta single and about the length of the saddle; upper caudal seta with 10 short branches, lower single and long. Ventral brush with 4 pairs of many-branched setae in the barred area and 4 unpaired, branched setae outside. "Gills" long and pointed, upper pair a little over 3 times the length of the saddle, lower slightly shorter.

Pupa.—The nomenclature used for describing the chaetotaxy of this pupa is that of Knight and Chamberlain (1948).

Thorax.—Trumpets short, cylindrical and dark throughout; opening small. Hair 1 long and single; 2 and 3 a little shorter and bifid; 4 about half the length of 1 and 4-branched; 5 single, about the same length as and set well above 4; 6 and 7 close together, 6 single and very short, 7 split well beyond the base into 4 branches, and a little longer than 4; 8 split well beyond the base into 3–4 branches; 9 single; 10 with 6–8 branches and a little shorter than 11, which is long and single; 12 the same length as 10, but with 4–5 branches. *Abdomen.*—Hair 0 present on tergites III–V and hair 1 of the usual form on II–VIII. *Tergite I:* Hair 2 a large tuft of 17–19 dendriform branches; 3 single and one-third the length of 4, which is single on one side and is split beyond the base into 4 branches on the other; 5–6 group about the same length as 3 with a tuft of 12 branches and a shorter single hair; 7 and 10 of equal length, a little longer than 4, bifid and single respectively; 8 short and fine. *Tergite II:* Hair 2 a 5-branched very dendriform tuft; 3 single, above and slightly internal to 4 which is long, strong, single seta; 5 with 7–8 branches; 6 with 9 branches; 7 and 10 of equal length, a little longer than 5, 7 with 2 branches which are divided again apically, 10 bifid; 8 minute. *Tergites III–VII:* Hair 2 a little more than half the length of the following segments and with 8, 4, 4, 3 and 2–3 branches respectively; 3 a small spinous hair internal to 2; 4 associated with 2 on III, V and VI, and with hair group 5–6 on IV and VII, it is longer than 2, stout and single on III, single, fine and shorter on VI and split beyond the base into 2–3 branches on IV, V and VII; 5 with 6–8 branches on III, on IV and VII it is long and bifid, it is detached on

V and VI ; 6 with 3–7 branches, the more numerous branches being on the distal segments and on IV it is single on the specimen examined ; 7 fairly long with 2–3 branches on III and IV, and single on the other segments ; 8 as on II except on VII where it has 3–4 short branches. *Tergite VIII :* Hair 5 long and single ; 8 strong, bifid, and about one-third the length of the paddles. Sternites with hair 9 and 10 short, and 2–3 branched on III–V,

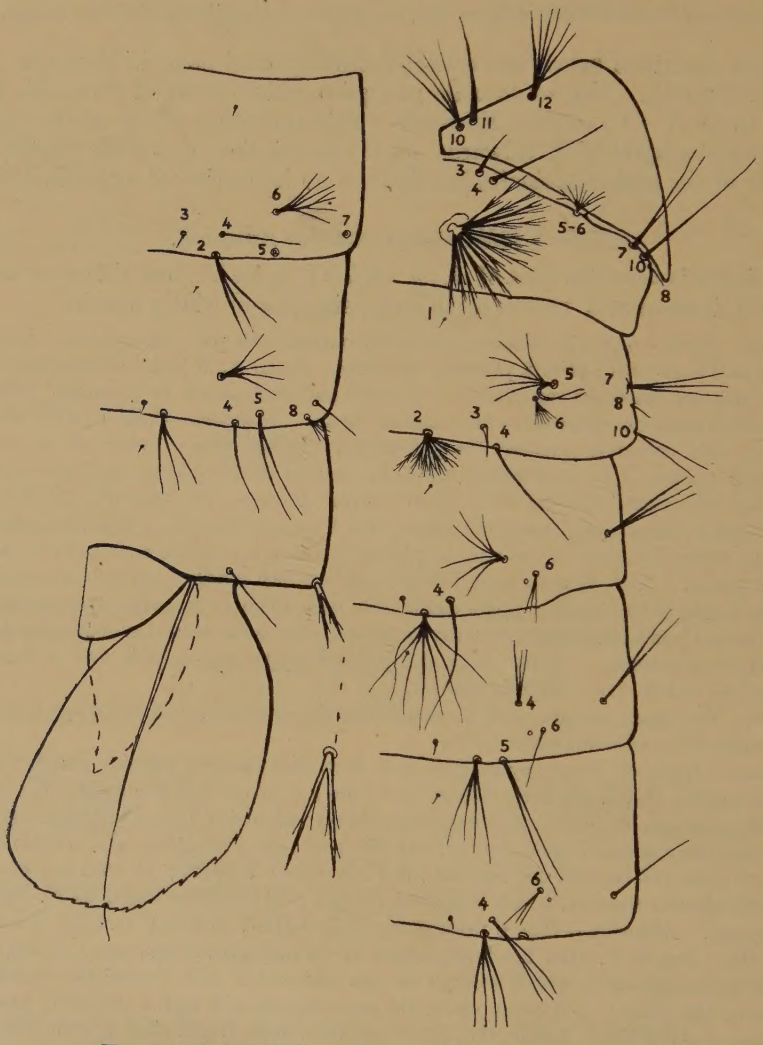

FIG. 1.—*Aëdes* (*Aëdimorphus*) *mutilus* Edwards. Pupa.

9 the same on VI and VII, but 10 longer and single and placed on the posterior margin ; 11 long and single ; 12 very short, internal to 11 on III–V and external on VI–VII ; 13 does not appear to be present on V, but is present on all other unmodified segments and on VIII. Paddles pale, oval, with a strong midrib and an external buttress to a half, and very finely spiculate on the outside edge and round apex ; seta short, simple and single.

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EDWARDS, F. W., 1941, *Mosquitoes of the Ethiopian Region* **3** : 170.

KNIGHT, K. L., and CHAMBERLAIN, R. W., 1948, A new nomenclature for the chaetotaxy of the mosquito pupa, based on a comparative study of the genera (Diptera : CULICIDAE). *Proc. helminth Soc. Wash.* **15** : 1–10.

ETHIOPIAN CULICIDAE: A DESCRIPTION OF A NEW SUB-SPECIES OF *AËDES* (*AËDIMORPHUS*) *TRICHOLABIS* EDWARDS.

By Mrs. E. C. C. van Someren.

(*Division of Insect-Borne Diseases, Medical Research Laboratory, Nairobi, Kenya.*)

Aëdes (*Aëdimorphus*) *tricholabis* ssp. **bwamba** subsp. n.

The male terminalia of this species do not differ from the figure of *A.* (*A.*) *tricholabis* Edwards (1941), nor from one male examined from Gede, the type locality. The adult ornamentation differs from that of *tricholabis* by having broad creamy white scales on all lobes of the scutellum and closely resembles *A.* (*A.*) *congolensis* Edwards, one specimen of which was available for comparison. No definite character was found, other than the male terminalia, which would serve to separate this species from *congolensis*, except that some specimens had broad pale scales on the *ppn*. No bred females were available for study. On examining a series of females collected from the same area at the same time as the males of this species and the *congolensis*, no females with broad scales on the *ppn* were found. It was concluded that it was probably not possible to separate the females of these two species.

Male.—Head. All decumbent scales pale yellow, broad at the sides, and narrow on the vertex. Palpi and proboscis dark brown; palpi longer than the proboscis by the terminal segment. *Thorax.*—Integument dark brown. Scutum covered with narrow dark brown and pale yellow scales, not forming a definite pattern, and the brown scales predominate. Scutellum clothed with broad creamy white scales on all lobes; *apn* and *ppn* with narrow scales, and may also have some broad pale scales; paratergites with broad pale scales; propleurae with some scales and post-spiracular and subspiracular scales few in number. *Abdomen.*—Tergites dark brown with narrow yellowish basal bands; sternites pale with broad dark apical bands. *Legs* dark brown. All femora with a pale line below, extending onto half the posterior surface basally; hind femora also with a pale line for the full length on the ventral half anteriorly and with a pale knee spot. All tibiae with pale apical spots, that on the hind tibiae as long as broad; fore and mid tibiae with a creamy white line posteriorly; hind tibiae all dark. All tarsi dark. *Terminalia* as in *tricholabis*. Style with a long arm broadened apically. The arm bears a row of branched hairs above and the broad apical portion has a long horn above, a stout curved spine below and a row of 5 stout, short, sharp pointed spines distally. Paraprocts short.

The early stages were determined on the evidence of material bred by Dr. Haddow, of the Yellow Fever Institute, Entebbe. Unfortunately the adults were destroyed by mites, but a male had been dissected and proved to be this species. Further evidence was given by unhatched pupae with associated larval pelts. The adults on being dissected proved to be males and the terminalia were examined.

Larva.—The larva is very similar to *A.* (*A.*) *filicis* I. & De M., from which it can be differentiated by having the head setae B and C only 2-branched.

Dr. Haddow (personal communication) states that the larvae are very pale and transparent in life, with the eye spots very large and black. Usually the swimming is done with the mouth brushes, but when they are disturbed, body

swimming movements occur. They are markedly restless, often looping the loop under water and have a habit of browsing.

The larval skins are very fragile, with all the setae pale and transparent and easily detached.

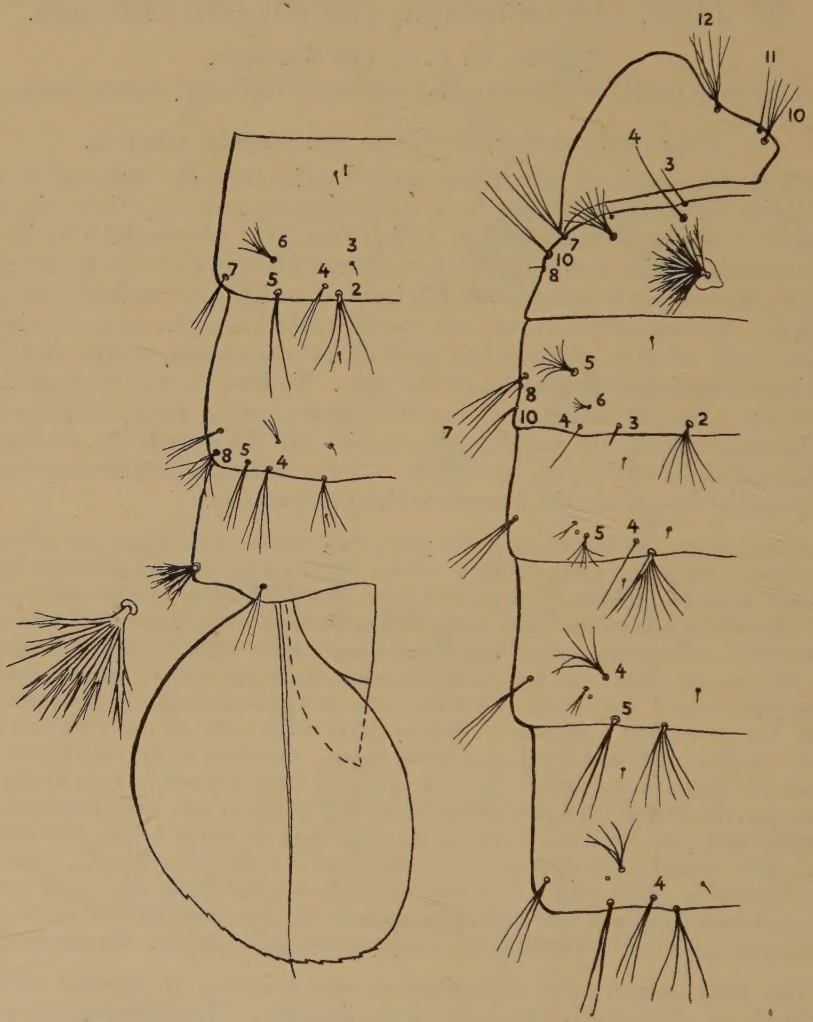

FIG. 1.—*Aëdes* (*Aëdimorphus*) *tricholabis* subsp. *bwamba*. Pupa.

Head.—Antennae pale throughout, not much shorter than the head, curved, and spiculate ; tuft at a half has been detached in all specimens ; terminal setae just below the apex. Seta A short and with about 6 very fine branches ; B and C longer, stouter, plumose and 2-branched ; *d* small, very fine and inconspicuous, and with about 4 branches. Mentum with 16 teeth on either side of the central tooth. *Abdomen.*—Comb a patch of 17–21 broad, pale, coarsely fringed scales. Siphon pale, index about 4 ; pecten not quite reaching to a half, of 17–19 slightly darker spines, each with one course, and sometimes with an extra one or two smaller, ventral denticles, the last 2 spines wide spaced and larger ; subventral

tuft beyond a half and with 5–7 very fine branches which are less than the diameter of the siphon at point of attachment. Anal segment with a large pale saddle, the distal edge of which has a patch of large pale spicules ; lateral seta single or 2-branched and about the length of the saddle. Upper caudal seta with 11–14 short branches, lower single. Brush with 4 paired setae in the barred area and 4 many-branched, unpaired setae outside. " Gills " about twice the length of the saddle and pointed.

Pupa (Fig. 1).—The nomenclature used for describing the chaetotoxy of this pupa is that of Knight and Chamberlain (1948).

Thorax.—Trumpets dark, short and cylindrical. Hair 1 fairly long and stouter than the rest, single or bifid ; 2 and 3 half the length of 1, and with about 4 fine branches ; 4, 5 and 7 about the same length and with 5–6, 3–4 and 5 branches respectively ; 6 half the length of 7, and with 2–3 branches ; 8 with about 10 and 9 with 4–5 branches ; 10 and 11 fairly long, 10 with about 3 branches and 11 simple and stout ; 12 shorter than 11 and with 4–5 branches. *Abdomen.—Tergite I :* Hair 2 a many-branched dendriform tuft ; 3 and 4 single, 3 a half to two-thirds the length of 4 ; 5–6 group with a tuft of about 10 branches and a much shorter single or bifid seta ; 7 and 10 with 2–3 branches and about the same length as 4 ; 8 single and short. *Tergite II :* Hair 2 with 7–9 fine branches ; 3 placed between 2 and 4 and a stout spinous hair ; 4 single and fairly stout, about the same length as 2 and placed below 5–6 group ; 5 with 8 branches and placed above 6 which has about 5–6 short branches ; 7 with 3–5 fairly long branches ; 8 short and spinous ; 10 single or bifid. *Tergites III–VII :* Hair 2 as on tergite II with about 7–9 branches on III and 3–8 on the rest ; 3 short and spinous and internal to 2 ; 4 about the same length as and associated with 2 except on IV and VII, where it is associated with 5–6 group, it is single on III, with 2–4 branches on V and VI, and with 4–7 branches on IV and VII ; 5 with 5–7 branches on III, on IV–VII it has 2–4 branches which are slightly stouter and longer than the other setae except on VII, where it is about the same length as the other setae ; 6 a tuft of 2–7 branches with the more numerous branching on the distal segments ; 7 with 4–6 branches on III and with 2–4 branches on the rest ; 8 a short spinous seta except on VII, where it has 6–8 fine branches. *Tergite VIII :* Hair 5 fairly long and with 2–3 branches ; 8 with 5–8 coarsely plumose branches. *Sternites* with hair 9 short and multiple branched ; 10 with 3–7 branches on III–V, single, longer and on the posterior border on VI–VII ; 11 single and longish except on VII where it is bifid or trifid ; 12 very short and internal to 11 on III–V, longer and external to 11 on VI and VII ; 13 present on III–VII. Paddles broad and pale, with a strong mid-rib and an external buttress to a half, finely spiculate round the external margin and round the apex ; seta short and bifid.

Described from the holotype, 6 male paratypes, 5 larval and 9 pupal pelts from Uganda, Bwamba, Toro District.

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Edwards, F. W., 1941, *Mosquitoes of the Ethiopian Region* **3** : 179.

Knight, K. L., and Chamberlain, R. W., 1948, A new nomenclature for the chaetotaxy of the mosquito pupa, based on a comparative study of the genera (Diptera : Culicidae). *Proc. helminth. Soc. Wash.* **15** : 1–10.

THE ODONATA OF MAURITIUS, SUBORDER ANISOPTERA, AND THE DESCRIPTION OF A NEW SPECIES OF ZYGOPTERA.

By Lt.-Col. F. C. Fraser, I.M.S. (Retd.), F.R.E.S.

In two previous papers (1949, *Trans. R. ent. Soc. Lond.* **100** : 135, and *Proc. R. ent. Soc. Lond.* (B) **18** : 130) I dealt with the Zygoptera and *Hemicordulia* of Mauritius : it now remains to deal with the Anisoptera and a new species of Zygoptera which Mr. J. Vinson has sent to me since those two papers were written. With this new species, the number of Odonata found in Mauritius now stands at 21, of which 8 belong to the suborder Zygoptera and the remaining 13 to the Anisoptera, all of which, save *Platycnemis mauriciana* Selys and *Thalassothemis marchali* (Rambur), lie before me. Of these, only 9 are peculiar to the island, the remainder being distributed widely throughout much of the African or Asiatic Continent or both. All breed in still waters save the problematical *Platycnemis*, species of which I have found always confined to small runnels or seepages. Mr. Vinson has sent me the following notes on their habitats : " Moka is my headquarters, it is in the north-west section of the island, with an altitude of 1100 ft. There is a river in the immediate vicinity. Les Mares is at an altitude of 2200 ft. on the south-western plateau. It is a wild place mostly covered with indigenous vegetation where swamps and streams are found. Palmars is at sea level on the east coast, close to the sea. Dragonflies are found near marshes more or less brackish in content."

It is obvious that the bulk of the species have been introduced by immigration and it is highly probable that *Ischnura vinsoni* Fraser has originated from *I. senegalensis* Rambur, but the problem of *Coenagriocnemis rufipes* (Selys) and *ramburi* sp. n., and *Coenargiocnemis insulare* (Selys) presents greater difficulties as they show no very close affinities to either Ethiopian or Oriental genera. I am inclined to think that they are from the same stock as the genus *Ischnura*, as their anal appendages agree closely with those of some of the South American Ischnuras and, moreover, their venation and the dorsal tubercles on the apex of segment 10 suggest such an origin. It is possible that they are the remnants of a somewhat extensive fauna which once inhabited the island and which would be comparable to the expansion of the same genus in the Samoan Islands.

Coenagriocnemis ramburi sp. n.

Male.—Abdomen 40 mm. Hind wing 23 mm. Pterostigma 1·25–1. Head : Labium straw-coloured, labrum black bordered anteriorly with yellow, anteclypeus finely yellow, postclypeus, frons and dorsum of head blackish brown with a dull steely reflex and large blue triangular postocular spots on the occiput. Beneath head entirely black. Prothorax blackish brown, with the anterior collar and lower parts of sides yellow ; posterior lobe flatly arched and with a small median notch. Thorax dull cupreous brownish black on dorsum to slightly posterior to the humeral suture, then pale yellow (or probably blue

during life), marked with narrow, complete ochreous antehumeral stripes. Laterally an ill-defined dark point on the upper part of the first lateral suture and a complete black line on the second. Pectus black save for a small posterior triangular mark. Legs pale olivaceous, femora blackish on the extensor surface, tibiae blackish brown on the same surface, tarsi pale but the claws black. These limbs robust, short and with armature similar to that of *C. insulare* (Selys). Wings hyaline, 17–18 postnodals in fore wings, 15–16 in the hind; *Ac* slightly nearer the distal antenodal level; anal vein leaving the posterior border of wing at a point mid-way between the two antenodals and rather more than the length of *Ac* proximal to that cross-vein; *Riv* proximal to subnodus, *IRiii* from the subnodus; *Riii* at the sixth or seventh postnodal. Pterostigma narrow, very acute

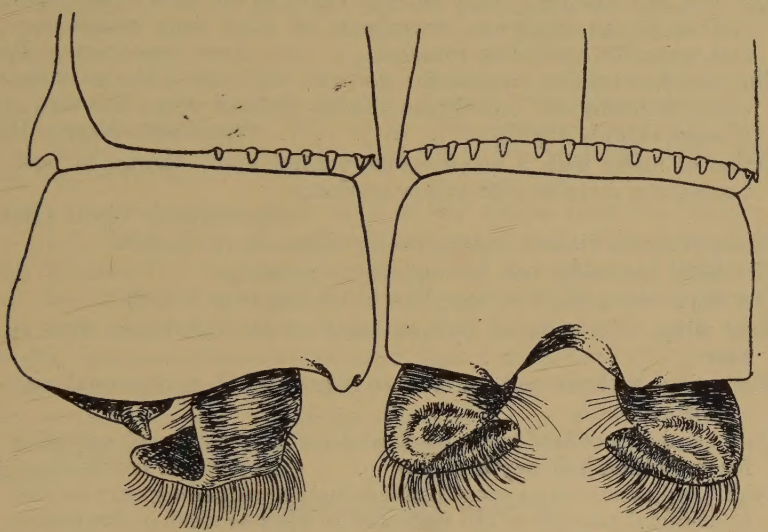

FIG. 1.—Anal appendages of *Coenagriocnemis ramburi* sp. n., male, shown from the left side and dorsum.

at both ends, pale golden yellow with dark, greyish centre, covering about $1\frac{1}{2}$ cells. Abdomen bronzed black dorsally from segments 1 to 7, yellowish at the sides and with dorsally-interrupted apical rings on segments 2 and 3; segments 8 to 10 entirely blue. Anal appendages black, superiors about half the length of segment 10, conical as seen from the dorsum and with a robust spine springing from the ventral side of apex, which is visible only on the inner side; laterally the apical half is seen to make a sharp medial ventral twist to end in the spine mentioned above; the apical border fringed heavily with long, curling greyish hairs. Inferiors very short and inconspicuous, conical surmounted by a short upturned spine resembling that common in *Enallagma*. These appendages closely similar to those of *C. rufipes* (Selys).

Two males from Les Mares, Mauritius, 24.vi.47, coll. J. M. Vinson.

The even distribution of characters found in this species, partly those of *C. insulare*, partly of *C. rufipes*, suggests a possible hybridism, but further collecting may show it to be locally common and a good species. It resembles *insulare* in its larger size and short robust legs, whilst its anal appendages and the complete antehumeral stripes belong to *C. rufipes*.

Suborder Anisoptera.

Key to Genera and Species.

1. Discoidal triangles in fore and hind wings of the same size and shape, and filled with a network of secondary venation . . . . . 2.
   Discoidal triangles in fore and hind wings differing in shape: that of the fore wing with its long axis in the breadth of the wing, that of the hind wing with its axis in the length of the wing. The triangle of fore wing with not more than 1 or 2 cross-veins, that of the hind wing usually free of such . . . . . 3.
2. The vein Riii making a sharp anterior curve at the level of the outer end of the pterostigma; membrane of hind wing conspicuous and tornus of hind wing rounded . . . *Anax mauricianus* Rambur.
   The vein Riii making an anterior curve at the level of the proximal end of pterostigma; membrane obsolete in hind wing; the tornus of same sharply angulated . . . . . *Gynacantha bispina* Rambur.
3. Tibiae of males with a membranous ventral keel; thorax of both sexes green metallic with yellow markings *Hemicordulia virens* (Rambur).
   Tibiae of males without ventral keels; thorax never metallic . . . 4.
4. The distal antenodal vein incomplete in fore wings . . . . . 5.
   The distal antenodal vein complete, extending from C to R . . . 11.
5. Hind wings with a broad opaque black or blackish-brown area at base . . . . . 6.
   Hind wings without such an area or, if present, then very small and inconspicuous . . . . . 7.
6. Dark basal area of hind wings black with metallic lustre and extending for more than half-way to nodus . . *Rhyothemis semihyalina* (Desj.).
   Dark basal area of hind wings blackish-brown, extending only to base of discoidal triangle in the male and to apex of same in the female *Tramea limbata* (Desj.).
7. Abdomen very long and very slender, always longer than the hind wing; apices of all wings deeply enfumed; crepuscular species *Zyxomma petiolatum* Rambur.
   Abdomen always considerably shorter than hind wing; apices of wings rarely enfumed; diurnal species . . . . . 8.
8. Only 2 rows of cells adjacent to discoidal triangle in fore wings; adult males black with wings partly enfumed after the nodus *Diplacodes lefebvrei* (Rambur).
   3 rows of cells adjacent to discoidal triangle in fore wings . . . . 9.
9. Venation of wings in male distinctly red, the thorax violaceous, that of female yellow with black markings; summit of frons coppery or violaceous metallic . . . . . *Trithemis haematina* (Rambur).
   Venation of wings yellow or blackish; thorax in both sexes a uniform olivaceous yellow without markings . . . . . 10.
10. Males with a small yellow spot at extreme apices of wings, more pronounced in the hind wings; base of hind wings bordered with amber yellow; diurnal species . . . . . *Pantala flavescens* (Fbr.).
    Males with a broad amber yellow area between nodus and discoidal triangle of hind wings often bordered distally with milky opalescence; these markings less evident in the females; crepuscular species . . . . . *Tholymis tillarga* (Fbr.).

11. Only 6 antenodal veins in fore wings, 5 in the hind ; abdomen moderately stout . . . . . *Macrodiplax cora* (Brauer).
    At least 11–13 antenodals in fore wings . . . . . 12.
12. Two cubital cross-veins in hind wings ; frons green metallic ; hind wing triangles crossed . . *Thalassothemis marchali* (Pal. de Beauv.).
    Only 1 cross-vein in cubital space of hind wings ; frons non metallic ; hind wing discoidal triangle without a cross-vein
    Orthetrum brachiale (Pal. de Beauv.).

Anax mauricianus Rambur.

Anax mauricianus Rambur, 1842, Ins. *Nèvrop.* : 184 ; Selys, 1862, *Maillard Reunion* **2** : 34 ; Brauer, 1866, *Novara* : 60 ; Selys, 1869, *Pollen and Van Dam, Madag. Ins.* : 23 ; McLachlan, 1881, *J. Linn. Soc. Zool.* **16** : 182 ; Selys, 1887, *Ann. Soc. ent. Belg.* **31** : 66 ; Gerst. 1891, *Jahrb. Hamb.* **9** : 7 ; Kirby, 1898, *Ann. Mag. nat. Hist.* (7) 2 : 243 ; McLachlan, 1903, *N.H. Socostra* : 401 ; Grunberg, 1903, *Zool. Jahrb.* (*Syst.*) **18** : 708 ; Martin, 1908, *Cat. Coll., Selys, Aeschnines* : 10 (as race of *A. formosus*) ; Ris, 1908, *Jenaische Denkschr.* **13** : 320 ; Sjöstedt, 1909, *Kilimanjaro* : 30 ; Martin 1915, *Voy. Alluaud Jeannel, Odon.* 39 (as *Anax formosus*) ; Ris, 1917, *Rev. Suisse Zool.* **25** : 147 ; *Id., Ann. S. Afric. Mus.* **18**, 3 : 368 ; Campion, 1923, *Ann. Mag. nat. Hist.* (9) **11** : 23.

I have received only a single male of this species from Mr. Vinson, taken over a river, Moka, 12.ii.45. After comparing it with *Anax imperator* Leach (British specimens) I am quite unable to find any points of differentiation. I have also examined a large number of species from various parts of the African continent with similar results, so that I come to the same conclusion as Ris did, that *mauricianus* is not more than a racial form of *imperator*. The Committee on Generic Nomenclature convened by the Royal Entomological Society of London gave its opinion that there were no synonyms ! *A. formosa* Lind. has long been regarded as one such, and *Aeschna azurea* Charpentier is another.

Gynacantha bispina Rambur.

Gynacantha bispina Rambur, 1842, *Ins. Nèvrop.* : 211 ; Selys, *Pollen and Van Dam, Madagas. Ins.* : 24 ; Selys, 1872, *Rev. Mag. zool.* : 8 (as *G. radama*, which is the female of *bispina*). Gerst. 1891, *Jahrb. Hamb. wiss. Aust.* **9** : 7 ; Grunberg, 1903, *Zool. Jahrb.* (*Syst.*) **18** : 708 ; Martin, 1909, *Cat. Coll. Selys, Aeschnines*, 180 ; Ris, 1915, *Ent. Mitt.* **4** : 141.

One male, Moka, 7.vi.45 and one female, 6.xii.45, coll. J. Vinson.

Rambur's description is a generalized one for a *Gynacantha*, and does not mention the T-shaped marking on the summit of the frons. The female does not show this, but has a basal black line to the frons. The dimensions of the two specimens are as follows : *Male.* Abdomen with appendages 50 mm., hind wing 45 mm. (considerably smaller than those for *A. imperator*, which Rambur stated they agreed with). *Female.* Abdomen 55 mm., hind wing 50 mm. The legs are ochreous in the female, but a much paler yellow in the male. I have not seen specimens from the African continent or from Madagascar, but it is highly probable that these belong to a different species.

Hemicordulia virens Rambur.

This species has already been discussed in my previous paper : since that was published I have received three more specimens, one pair of which were taken *in cop.* The dates of collection were : Male and female, 5.ii.48 ; male,

9.xii.48, and female, 30.xii.48, all from Moka. They exhibit no special features and their venation shows a remarkable similitude.

Thalassothemis marchali (Rambur).

This elusive species has not been discovered again, and is still known from only three specimens, one in the Selysian collection, which is probably Rambur's type, and two damaged specimens in the Hope Museum. Ris places the genus next to *Trithemis* Brauer, but it is evident from the proximal position of the arculus and the complete distal antenodal that it stands nearer *Lathrecista* Kirby.

Orthetrum brachiale (Palisot de Beauvois).

Libellula brachialis Palisot de Beauvois, 1805, *Ins. Afr. Amer.* : 171.
Orthetrum brachiale Ris, 1909, *Cat. Coll. Selys, Libellulines* : 198.
For the other numerous references, the reader is referred to this last work ; other references not mentioned therein are as follows : Campion, 1914, *Ann. Mag. nat. Hist.* (8) **13** : 500 ; Ris, 1915, *Ent. Mitt.* **4** : 142 ; Martin, 1915, *Voy. Alluaud Jeannel Afr. Odon.* : 32 ; Sjöstedt, 1917, *Ark. Zool.* 11, **14** : 2 ; Ris, 1917, *Rev. Suisse Zool.* **25** : 149 ; *Id., Cat. Coll. Selys, Libellulines,* 1909 : 1085 ; Campion, 1921, *Ann. Mag. nat. Hist.* (9) **8** : 240 ; Ris, 1921, *Ann. S. Afr. Mus.* **18**, 3 : 393, 399 ; Morton, 1928, *Ent. mon. Mag.* **64** : 121 ; Longfield, 1936, *Trans. R. ent. Soc. Lond.* **85** : 486, 496–498 ; Fraser, 1949, *Mem. Inst. Sci. Madagas.* A, *III*, **1** : 25 ; *Id.*, 1949, *Exploration du Parc Nat. Albert, Mission de Witte,* Odonata : 16.

A species which is widely distributed throughout continental Africa and Madagascar and which appears to be a common insect in Mauritius where it is the only representative of its large genus.

Diplacodes lefebvrei (Rambur).

There are some 50 references to this common and widespread species given in Ris, 1911, *Cat. Coll. Selys, Libellulines* : 465, to which the reader is referred. The small examples with uncoloured wings contrast sharply with the large specimens from Mauritius and Madagascar, but these differences seem confined to the males. The specimens before me from Mauritius are quite the largest which I have seen : Male, abdomen 22 mm., hind wing 27 mm. and abdomen 25 mm., hind wing 29 mm. These contrast with specimens which I took in Iraq with abdomen 17 mm. and hind wing 19 mm.! The apical and postnodal costal band of infuscation is very pronounced in the males, whereas it is entirely absent from specimens which I have taken in south-western India. It is evident that racial differences are fast approaching those with a specific value. Mr. Vinson's specimens were taken during November and December, but a number have no date on the labels.

Trithemis haematina (Rambur).

Libellula haematina Rambur, 1842, *Ins. Névrop.* : 84 ; Selys, 1850, *Rev. des Odon.* : 27, *Id.*, 1862, *Maillard, Reunion, II* : 32, 34 ; *Id.*, 1869, *Pollen and Van Dam, Madagas. Ins.* : 22.
Trithemis haematina Brauer, 1868, *Verh. zool. bot. Ges. Wien* **18** : 736.
Tramea erythraea Brauer, *ibid.*, **17** : 814 ; Kirby, 1890, *Cat. Odon.* : 4 ; Calvert, 1895, *Proc. U.S. nat. Mus.* **18** : 144.
Trithemis erythraea Karsch, 1893, *Berlin ent. Zeit.* **38** : 23 ; *Id.*, 1894, *Ent. Nachr.* **20** : 382 ; Calvert, 1896, *Proc. U.S. nat. Mus.* **22** : 216.
Trithemis ramburi Kirby, 1890, *Cat. Odon.* : 19.
Trithemis haematina Fraser, 1949, *Mem. Inst. Sci. Madagas.* A, *III*, **1** : 26.

This species, which is the only representative of a large Ethiopian and Asiatic genus, is confined to Mauritius and Madagascar and the surrounding groups of islands.

It so closely resembles the common and widespread *Trithemis aurora* (Burm.) of the oriental region that it is reasonable to suspect that Mauritius was the stepping-stone in the spread of this preponderatingly African genus to Asia. *T. haematina* seems to be the commonest Libelluline found in Mauritius : April and May appear to be the height of its season, but it is probably on the wing all the year round like its near relative *aurora*.

Zyxomma petiolatum Rambur.

Zyxomma petiolatum Rambur, 1842, *Ins. Nèvrop.* : 30 ; Hagen, *Verh. zool.-bot. Ges. Wien* **8** : 479 ; Brauer, 1867, *Verh. zool.-bot. Ges. Wien* **17** : 287 ; *Id., ibid.* **18** : 712 ; Selys, 1878, *Mitt. Mus. Dresden* : 293 ; *Id.*, 1888, *C.R. Soc. ent. Belg.* 7.vii.88 (sep.) ; Kirby, 1889, *Trans. Zool. Soc. Lond.* **12** : 301 ; *Id.*, 1890, *Cat. Odon.* : 35 ; Selys, 1891, *Ann. Mus. civ. Genova* **30** : 439 ; Kirby, 1893, *J. Linn. Soc. Zool.* **24** : 554 ; *Id.*, 1894, *Ann. Mag. nat. Hist.* (6) **14** : 19 ; Laidlaw, 1902, *Proc. zool. Soc. Lond.* **1902** : 64 ; Martin, 1904, *Mission Pavie* (sep.) : 7 ; Tillyard, 1906, *Proc. Linn. Soc. N.S.W.* **31** : 480 ; Van der Weele, 1909, *Nova Guinea* **5**, *Zool.* : 386 ; Ris, 1911, *Ann. Soc. ent. Belg.* **55** : 254. Campion, 1913, *Trans. Linn. Soc. Lond.* (*Zool.*) **15** : 438. *Zyxomma sechellarum* Martin, 1896, *Mem. Soc. zool. France*, **9** : 254.

Zyxomma petiolatum Ris, 1913, *Cat. Coll. Selys, Libellulines* **15** : 901 ; *Id., ibid.* **16** : 1219. Ris, 1915, *Nova Guinea, Zool.* **13** : 127 ; Fraser 1920, *J. Bombay nat. Hist. Soc.* **27** : 256 : *Id., ibid.* **29** : 54 ; *Id.*, 1924, *Rec. Ind. Mus.* **26** : 442 ; *Id., ibid.*, 1931, **33** : 446 ; Ris, 1927, *Zool. Mededeel.* **10** : 43.

This interesting species is a new record for the island of Mauritius : Mr. Vinson has sent me a single male taken on 1.ii.48 at Moka but without further data. The species is a crepuscular one and might have come to light ; most specimens which I have taken have been captured down large-mouthed wells in the depths of which the insects could be seen flying round and round like a goldfish circling its bowl. In the Laccadive Islands Mr. Souter witnessed it flying during the day-time in scores ; it seemed to be the only dragonfly on the islands which circumstance might account for its change of habits and phenomenal increase. It has a distribution from Japan, China and Australia to as far as the Seychelles, and I think it very probable that it also occurs on the mainland of Africa, but owing to its crepuscular and secretive habits has escaped notice so far.

Rhyothemis semihyalina (Desjardins).

Libellula semihyalina Desjardins, 1835, *Ann. Soc. ent. Fr.* **4** : iv (Mauritius).

Rhyothemis semihyalina Hagen, 1867, *Stettin. ent. Zeit.* **28** : 232 ; Ris, 1913, *Cat. Coll. Selys, Libellulines* **15** : 963. For all the numerous references before and subsequent to this, this latter work should be consulted. Additional references after 1912 are as follows : Campion, 1913, *Trans. Linn. Soc. Lond.* **15** (4) : 438 ; le Roi, 1915, *Zentr. Afric. Exp. zool.* : 360 ; Sjöstedt, 1917, *Arkiv. Zool.* **11** (13) : 2 ; Ris, 1921, *Ann. S. Afr. Mus.* **18** (3) : 433 ; Morton, 1924, *Trans. ent. Soc. Lond.* **1924** : 44 ; Fraser, 1949, *Mem. Inst. Sci. Madagas.*, A, *III* **1** : 19, 26.

Mr. Vinson reports that this species is rare in the island and difficult to catch. This is surprising, as species of the genus known to me always occur in large colonies and the air is full of the insects fluttering and soaring like

lepidopterous insects such as *Hestia*, *Danaus* or *Euploea*. *R. semihyalina* is evidently a descendant from the very nearly related *R. triangularis* Kirby of Ceylon and the Western Ghats of India. It has spread far and wide throughout Africa and Madagascar and has extended to as far as Palestine northwards! In spite of this it does not appear to be plentiful anywhere, and I note that Miss Longfield does not mention it in the many collections which she has reported on. Like *R. triangularis*, it very probably breeds in marshes, the nymph of the former resembling a *Libellula* but being very black in colour, thus agreeing with the dark peaty waters and mud in which it lives.

Pantala flavescens (Fabricius).

This common and cosmopolitan species is well represented in Mr. Vinson's material as would be expected. In all probability it is an annual immigrant, as millions are seen annually flying westwards during the months of September and October throughout Southern India.

Tramea limbata (Desjardins).

Libellula limbata Desjardins, 1835, *Ann. Soc. ent. Fr.* **4** : 111 (Mauritius); Selys, 1862, *Maillard, Reunion, II* : 34.
Tramea limbata Kirby, 1889, *Trans. zool. Soc. Lond.* **12** : 318; Ris, 1916, *Cat. Coll. Selys, Libellulines*, **16** : 989.
Libellula mauriciana Rambur, 1842, *Ins. Nèvrop.* : 34; Brauer, 1868, *Verh. zool.-bot. Ges. Wein* **18** : 714.
Tramea limbata Campion, 1913, *Trans. Linn. Soc. Lond.* **15** (4) : 439 (pars.).

I do not agree with the late Dr. Ris that the many forms he has grouped together under one name, *limbata* Desjardins, should be considered as a single species. The original *limbata* from Mauritius is so distinct from all other forms that it can be picked out at a glance from any number of the others. The great extent of the basal marking in the hind wings and the irregular border of the same is highly characteristic of the species; thus I would restrict the name to the Mauritius insect and place the others under one of the synonyms which already exist. Of these, *Libellula stylata* Rambur, 1842, has priority, the type coming from Bombay, where I have taken the insect commonly. *L. incerta* Rambur and *L. similata* Rambur, both described in the same work as *stylata*, have page priority, but as both are *sine patria*, it is obvious that the name *stylata* should be chosen. A closely similar form has been described by Campion from the Chagos islands and Diego Garcia, but these may well be part of the same faunal area. *T. limbata* from Mauritius is surprisingly similar to the N. American *T. lacerata* Hagen, especially the females. Mr. Vinson has sent me seven specimens all in fine condition, of which all save one are males, four bearing data "Moka, v–vi.45." Two of the males exhibit a small hyaline area near the membrane but of no comparison to the large sinuous space seen in the single female. All males are alike in possessing an irregular border to the dark area, but it is more pronounced in three of them; in all it extends to the base of the discoidal triangle, and well on to the posterior border of the wing. In the female it extends to the distal end of the discoidal cell and has a very jagged outline but fails, however, to reach the posterior border of the wing as in the males.

Tholymis tillarga (Fabricius).

Libellago tillarga Fabricius, 1798, *Suppl. Ent. syst.* : 285. (For further references, Ris, 1913–1916, *Cat. Coll. Selys, Libellulines*, **15, 16** : 913, 1220, should be consulted.)

Only a single female of this widespread oriental and Ethiopian species has been received from Mr. Vinson. It is possible that he has overlooked it from not appreciating that it is a crepuscular species and not appearing on the wing until dusk. The present specimen was probably put up from its diurnal sleep ? It was taken at Moka, 6.xii.47 and is remarkable for the almost entire absence of the nodal coloured marking in the hind wing ; it would be of interest to learn if males from Mauritius resemble it in this respect. Its measurements are : Abdomen 31 mm., hind wing 38 mm., the largest recorded, but approaching those of one recorded by Ris from West Africa. The anal loop is also closed in both wings thus disagreeing with the general rule of the generic venation.

Macrodiplax cora Brauer.

Diplax cora Brauer, 1867, *Verh. zool.-bot. Ges. Wien* **17** : 20, 289.
Macrodiplax cora Brauer, 1868, *ibid.* **18** : 737. (For further references, consult Ris, 1913, 1916, *Cat. Coll. Selys, Libellulines*, **16** : 1036, 1227).

Two females only have been received from Mauritius, taken by Mr. J. Vinson, Moka, 24.v.47. They do not differ from type. The species immigrates annually and it is only during this time that specimens are secured and then usually in plenty. It is remarkable that a species which extends from the Pacific to as far as Mauritius and Madagascar has not yet been recorded from the African continent ; it surely must occur there and has probably been overlooked owing to its short immigrant season.

I take this opportunity of stating that it is my considered opinion that this genus, along with *Urothemis*, *Aethriamanta* and *Selysiothemis*, stand right apart from the rest of the family LIBELLULIDAE and much nearer the CORDULIIDAE ; they in fact form an annectant between the two families. Selys monographed the group (1897, *Ann. Soc. ent. Belg.* **41** : 68) and Ris grouped them under his "Urothemis-Gruppe," but as part of his Group X of the LIBELLULIDAE. Previous authors have failed to notice the importance of the *complete* distal antenodal which I have shown is so important in the classification of the LIBELLULIDAE. In all the genera of the group to which *Macrodiplax* belongs, this cross-vein is complete as in all the CORDULIIDAE, and moreover, I find that the two basal antenodals are bridged by membrane and so differ from those following distally : they are, in fact, the two *primary* antenodals of the COENAGRIIDAE and thus another point is found linking the group with the CORDULIIDAE. In view of these facts I have decided to remove this group of genera from the LIBELLULIDAE and give them family rank under the name of MACRODIPLACTIDAE.

ADDENDA.

In a final collection received from Mr. Vinson since this paper was sent in, I find two more male specimens of *Z. petiolatum* Rambur, one of which "came to light" thus confirming the crepuscular nature of the insect. There are also 7♂♂ and 3♀♀ of *Agriocnemis exilis* Selys (Moka, 17.xii.49), an addition to the island's fauna and bringing the number of species to 22. Selys, 1869, *l.c.*, gave this species as "Madagascar *ou* Mauritius" ; actually I have now received it from both islands.

A NEW PALAEARCTIC SPECIES OF *CHERSODROMIA* WITH VERY SHORT WINGS (DIPTERA: EMPIDIDAE).

By J. E. Collin, F.R.E.S.

A minute short-winged Empid was recently submitted to me for determination by the Commonwealth Institute of Entomology. The specimens were collected by Dr. H. Caspers, of the Hamburg Museum, at Mesembria on the Black Sea Coast, north of Burgas (Bulgaria), on the 28th August, 1941, and prove to represent an undescribed species of *Chersodromia*.

Species of this genus are some of the more decidedly terrestrial forms of the Tachydromiinae, and exhibit a wide range of differences in length of bristles and size of wings, varying from the strong bristles of such species as *C. hirta* Walker, to the extremely abbreviated bristles (especially on head and thorax) of *C. incana* Walker, and from the ample wings of such species as *C. speculifera* Walker, the shorter narrower wings of the type species *C. arenaria* Haliday, and the still shorter wings of the American *Thinodromia inchoata* Melander to the very short wings of the new species described below. A belief that these and other variable differences (including the position of the arista) are of generic importance has led to the proposal of the synonyms *Coloboneura* Melander (1902), *Halsanalotes* Becker (1902), and *Thinodromia* Melander, 1906. I possess, or have examined, specimens of the type species of all these supposed genera.

Chersodromia curtipennis sp. n., ♀.

A very minute grey species near *C. incana*, but bristles on head and thorax more distinct, and wings very much abbreviated.

Head as in *incana*, but the usual two pairs of ocellar bristles, one convergent and one divergent, and two pairs of vertical bristles, all of them white, more distinct. In *incana* they are minute whitish points. Antennae short, greyish, first joint scarcely distinguishable, second cup-shaped, third very little larger than second, rounded, with a microscopically pubescent arista arising from its upper terminal corner (much as in *incana*), end of third joint distinctly pubescent.

Thorax with the usual bristles of this genus much more distinct than in *incana*, notably the humeral and dorsocentral bristles, which in *incana* are in no way differentiated from other minute white points. No posthumeral bristle.

Abdomen decidedly longer than head and thorax together, and more yellowish-brown in ground colour, but dusted greyish. Its scattered pubescence all short and whitish. Terminal papillae oval, short-haired.

Legs yellowish-brown, paler on knees and basal joints of tarsi. All short hairs whitish, but the usual Chersodromid bristles on apical half of four posterior tibiae at least brownish. All femora with a small anterior preapical bristle (absent in *incana*). Front tibiae somewhat spindle-shaped, front tarsi rather short and stout, other tarsi much longer and more slender, all very much as in *incana*.

Wings whitish, very short and narrow, scarcely extending beyond end of second abdominal segment. Venation indistinct and somewhat incomplete, especially in costal area, the "radius" being only two-branched. Middle crossvein beyond the crossvein closing

second basal cell, and both very much nearer end of wing than in more fully developed wings. Halteres well developed, greyish-yellow.

Length about ·75 mm.

The five female specimens of this species were preserved in spirit. One was removed, pinned, and dried, and the above description has been drawn up mainly from that specimen.

The type species of *Thinodromia* (*inchoata* Melander) is intermediate between the above described species and *arenaria* Haliday, the short wings being indistinctly banded. The type species of *Coloboneura* (*inusitata* Melander) is allied to *C. hirta* Walker. I have examined one of Becker's original specimens of *Halsanalotes amaurus*, and it is a species of *Chersodromia* somewhat intermediate between *difficilis* Lundbeck, and *incana* Walker. Becker's figure of the antenna is misleading, the arista is not more dorsal than in *incana*, or *curtipennis*; even in *difficilis* Lundbeck and *arenaria* Haliday, the arista is decidedly supra-apical.

Book Notices.

Physiologie de l'Insecte: Les Grands Fonctions, le Comportement, Ecophysiologie. By Rémy Chauvin. 8vo. Paris (Institut National de la Recherche Agronomique), 1949. Pp. 619, 83 figs. and diagrams. Price 2,500 francs.

A general textbook of insect physiology under the headings: Integument, moulting and metamorphosis, digestion and nutrition, excretion, blood-system, fat-body, oenocytes, respiration, nervous system, locomotion, reflexes and tropisms, sense-organs, behaviour, reproduction, growth.

It is intended to give an account of the advances in insect physiology since the first appearance of Wigglesworth's textbook. The author points out that the information available is fragmentary and based upon a study of only a few genera in each Order. Consequently he contents himself with summarizing this information, and avoids embarking on generalizations. He has, on the other hand, given special attention to techniques, and figures suitable apparatus in many cases.

Each chapter has a long list of references.

The Bee-Hunter. By George Harold Edgell. Sm.8vo. Cambridge, Mass. (Harvard University Press) and London (Geoffrey Cumberledge), 1949. Pp. 49, 1 drawing, 7 photographs. Price 20*s*. (Twenty shillings).

An account of the technique of locating the nests of wild honey-bees by trapping foraging bees in a box, feeding them upon syrup, releasing them, and thus establishing a " bee-line " to the nest.

The author is Director of the Museum of Fine Arts in Boston, Mass., and his story of the behaviour of the bees is made up of his own observations and deductions over a period of 50 years. The name of von Frisch is not mentioned.

DESCRIPTIONS OF THREE NEW *SARCOPHAGA* SPECIES FROM THE ETHIOPIAN REGION (DIPTERA, CALLIPHORIDAE).

By F. Zumpt, Ph.D., F.R.E.S.

(The South African Institute for Medical Research, Johannesburg.)

Sarcophaga transvaalensis sp. n.

In Curran's key (1934) this species runs down to *S. alina* Curran and *S. momba* Curran, but the hypopygium is quite different in shape. This organ resembles mostly that of *S. angelicae* described by Engel (1924) from one male, which was reared by the late Dr. Brauns from a caterpillar taken near Vondeling Cape Province. Apart from distinct features in the hypopygium, the species is to be separated from *S. angelicae* by the bare first wing-vein, a pair of long bristles on the second visible tergite and a pair of well-developed prescutellar acrostichals.

Male.—Head silvery-white pollinose; frons about one-third as wide as either eye (narrowest part of frons: longest diameter of eye = 17:62), gently widening posteriorly and strongly widening in front; parafrontals reaching middle of second joint of antennae; antennae wholly black, third segment twice as long as the second; palpi slender, slightly curved, black.

Thorax cinereous pollinose, with the usual dark longitudinal stripes. Acrostichals 0 + 1, dorsocentrals 3 + 3, sternopleurals 3, scutellum with four pairs of bristles including discal bristles; the lateral bristles are missing. Propleura with rather long hairs, but prosternum entirely bare.

Wings hyaline, r_{1+2} bare, r_{4+5} with setulae to r–m on upper side, ventral side with a few hairs only on the root of r_3 and r_{4+5}; squama white, with a narrow yellowish margin. Halteres yellow.

Legs black, middle femora without a distinct ctenidium, with a row of small stronger bristles only, hind femora with a few strong antero-ventral bristles, hind tibiae with a fringe of long hairs.

Abdomen with the usual black and whitish pattern, second visible tergite (tergite 3) with a pair of long median bristles, hind margins of the third and fourth visible segments with a row of strong bristles each. Fifth sternite V-shaped, with a brush of short spines. First genital segment black, no bristly hairs on the posterior margin, second genital segment red. Cerci sharply pointed, phallosome bulbous, projecting posteriorly to form a tail-like plate which is supported by two spines: above this a second pair of slender, crescent-shaped lateral processes (fig. 1).

Female.—Unknown.

Length.—8 mm.

Locality.—Transvaal: 1 ♂ from Gemsbokfontein, 23 miles N.W. Naboomspruit, 20th February, 1949, leg. Zumpt. Type in the collection of the South African Institute for Medical Research, Johannesburg.

Sarcophaga guillarmodi sp. n.

Nearly related to *S. ferox* Villeneuve (= *marituana* Salem) from which, according to Séguy (1941), it can be separated in the male sex by a narrower

frons, very weakly developed marginal bristles on the second visible tergite, and by small differences in the hypopygium. The cerci are not provided, as in *S. ferox*, with a hump in the middle of the outer margin, and the appendages of the phallosome are shaped as in fig. 2.

Male.—Head silvery-white pollinose ; frons about half of eye-width (narrowest part of frons : largest diameter of eye = 24 : 67), gently widening posteriorly and strongly widening in front ; parafrontals reaching middle of second joint of antennae ; antennae

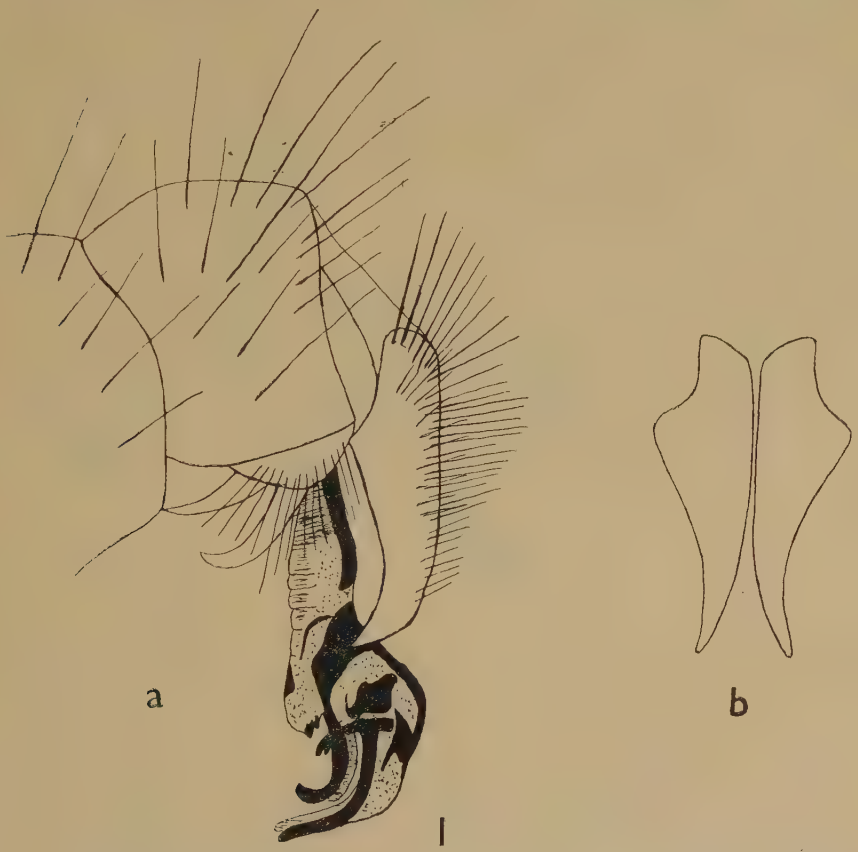

FIG. 1.—*Sarcophaga transvaalensis* sp. n. (*a*) Lateral view of male terminalia ; (*b*) frontal view of cerci.

black except the margin of the second segment which is narrowly red-brown ; palpi slender, slightly curved, black.

Thorax cinereous pollinose with the usual dark longitudinal stripes. Prescutellar acrostichals very weakly developed, dorsocentrals 2 + 3, sternopleurals 3, scutellum with four pairs of bristles including discal bristles, the lateral bristles are missing ; apical bristles crossed, less than half as long as the subapicals. Propleura and prosternum with fine and rather long hairs.

Wings hyaline, r_{1+2} with setulae on the basal half, r_{4+5} bristled nearly to cross-vein. On the ventral side are three hairs on the root of r_3 and r_{4+5} ; squama white, with a narrow yellowish margin. Halteres yellow.

Legs black, middle femora with a row of short antero-ventral bristles in the posterior half, thus forming a ctenidium, hind femora with long antero-ventral bristles, hind tibiae with a fringe of long hairs.

Abdomen with the usual black and whitish pattern, second visible tergite (tergite 3) with a very weakly developed pair of median bristles which are only a little larger and stronger than the remaining bristles, third tergite with a strong and erect pair of median bristles, margin of fourth tergite with a row of strong bristles. Fifth sternite V-shaped, provided with a brush of spines. First genital segment black, with some bristly hairs near the posterior margin, second genital segment red. Cerci pointed, no hump on the

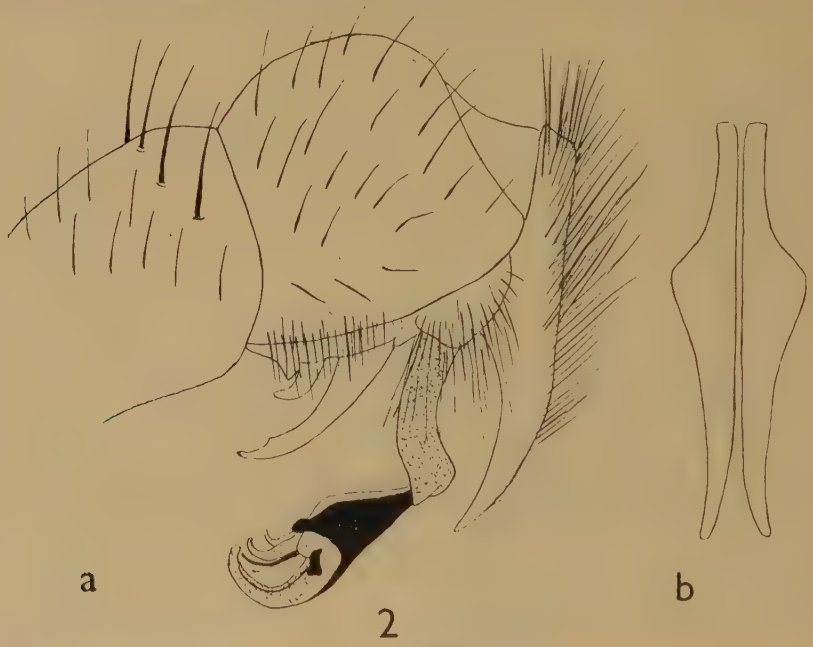

FIG. 2.—*Sarcophaga guillarmodi* sp. n. (*a*) Lateral view of male terminalia ; (*b*) frontal view of cerci.

middle of outer margin, phallosome strikingly long, bulbous in the posterior part and projecting backwards in the shape of a pair of slender united crescentic spines. Above this are two further pairs of smaller spines (fig. 2).

Female.—Unknown.

Length.—9 mm.

Locality.—BASUTOLAND : 1 ♂ from Mamathes, October, 1942, leg. A. Jacot-Guillarmod. Type in the collection of the Division of Entomology, Department of Agriculture, Pretoria.

Sarcophaga simillima sp. n.

Engel (1938) named a *Sarcophaga* species found by me in September, 1935, at the foot of the Cameroon Mountain with a query as to *kisangani* Curran (1934). He mentioned that the specimens before him had a bristled first wing-vein while this feature, according to Curran, is missing in *kisangani*. Furthermore,

Engel also found some differences in the male terminalia, but he thought that the drawings by Curran were not characteristic enough.

Fortunately Engel returned the only male and one female to me. I cannot believe that Curran overlooked such an important feature as the bristled r_{1+2} which he used in his key. Furthermore, the drawings given by Curran are not " uncharacteristic " at all, and Engel's drawing of (?) *kisangani* shows clearly that we are dealing with two different species.

Male.—Head silvery-white pollinose ; frons about one-third as wide as either eye (narrowest part of frons : longest diameter of eye = 20 : 66), gently widening posteriorly and strongly widening in front ; parafrontals level with the hind margin of second joint of antennae ; antennae wholly black, third segment about three times as long as the second; palpae black, slender and slightly curved.

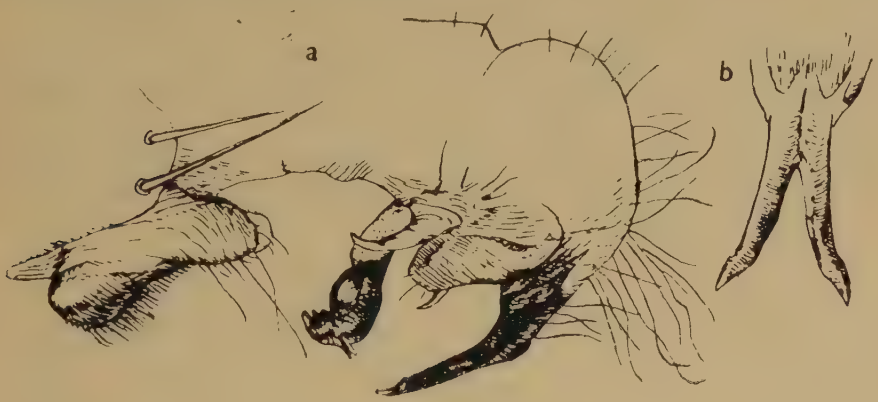

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Fig. 3.—*Sarcophaga simillima* sp. n. (*a*) Lateral view of male terminalia ; (*b*) frontal view of cerci.

Thorax cinereous pollinose, with the usual dark longitudinal stripes. Acrostichals 0 + 0, dorsocentrals 3 + 4, of unequal size, sternopleurals 3, scutellum with four pairs of bristles including discal bristles, the lateral bristles missing. Propleura with rather long hairs, prosternum haired too.

Wings hyaline, on the upper side r_{1+2} with setulae in the anterior half, r_{4+5} with setulae nearly till cross-vein, ventral side with a few hairs only on the root of r_3 and r_{4+5} ; squama whitish with yellow margin. Halteres light brown.

Legs black, middle femora with ctenidium, hind femora with 4–5 antero-ventral bristles, hind tibiae with a fringe of long hairs.

Abdomen with the usual black and grey pattern, second visible tergite (tergite 3) without median bristles, hind margins of the third and fourth visible tergites with a row of strong bristles. Fifth sternite red-brown, V-shaped and beset with strong short spines, basal part arched downwards. First genital segment black, no distinct bristly hairs on the posterior margin, second genital segment red. Cerci sharply pointed and distinctly bent in the anterior third, phallosome bulbous in the posterior half, with two terminal ear-like processes (fig. 3).

Length.—11 mm.

Female.—One female collected in the same locality and date as the male has been retained by Engel. Another female in my collection from a nearby locality was referred to this species with some doubt by Engel. The chief features are the same as in the male, but, nevertheless, it must remain doubtful if it really belongs to the male.

Locality.—1 ♂ (holotype) from Missellele, at the foot of the Cameroon Mountain, near Tiko, 6th–21st September, 1935, leg. Zumpt. The above-mentioned female was collected at Mundame, Mungo River, Cameroons. Engel retained two further females from Missellele collected in October, 1935. Holotype (♂) in the collection of the South African Institute for Medical Research, Johannesburg.

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NEW OR LITTLE-KNOWN SPECIES OF EXOTIC TIPULIDAE (DIPTERA): VII.

By Professor Charles P. Alexander, F.R.E.S.

(*University of Massachusetts, Amherst, Massachusetts.*)

The preceding part in this series of papers was published in 1949, *Proc. R. ent. Soc. Lond.* (B) 18 : 153–159. The species treated herewith are from Africa, where they were taken chiefly by my friends, the late Drs. John G. Myers and Jacob A. Reis. The types are preserved in my collection.

Tipula (Acutipula) auspicis sp. n.

Size relatively small (wing, male, about 15 mm.); antennae of male elongate, about one-half as long as body; general coloration of mesonotum reddish brown, the posterior sclerites and pleura yellow; unmarked; legs obscure yellow, the tips of the femora and tibiae narrowly and very inconspicuously darkened; wings with a very weak brownish tinge, cells *C* and *Sc* scarcely darker, stigma long and narrow, pale brown; *Rs* short and weak, about two-thirds *m-cu*; abdominal tergites reddish brown, sternites and hypopygium yellow; male hypopygium with the tergite produced into a narrow depressed-flattened blade that splits at apex into two weakly divergent earlike lobes, unprovided with spines; inner dististyle with the entire outer surface provided with very abundant erect spinous setae that are produced at tips into long hairlike points.

Male.—Length about 14 mm.; wing 15·5 mm.; antenna about 7 mm.

Frontal prolongation of head brown, relatively long; nasus small and inconspicuous, with long black setae; palpi black. Antennae (male) elongate, as shown by the measurements; scape, pedicel and extreme base of first flagellar segment yellow, remainder of organ black; flagellar segments long-cylindrical, with very feebly developed basal swellings, the verticils shorter than the segments, restricted to the enlargements; remainder of segments with an abundant erect white pubescence. Head cinnamon brown, the front paler; posterior orbits narrowly more yellowed.

Pronotum reddish brown medially, paling to yellow on the sides. Mesonotum chiefly reddish brown, without distinct dark pattern, the scutellum and postnotum more yellowed. Pleura yellow. Halteres pale brown, the base of the stem restrictedly yellow. Legs with all coxae and trochanters yellow; remainder of legs obscure yellow, the tips of the femora and tibiae narrowly and very inconspicuously darkened; outer tarsal segments scarcely infuscated. Wings with a very weak brownish tinge, cells *C* and *Sc* scarcely darker; stigma long and narrow, pale brown, inconspicuous; veins brown, in the costal field more yellowish-brown. Venation: *Rs* short and weak, about two-thirds *m-cu* and three-fifths the long R_{2+3}; R_{1+2} gently upcurved; petiole of cell M_1 and *m* subequal; cell 1*st* M_2 relatively long, the second section of M_{1+2} more than twice the basal section.

Abdominal tergites reddish brown, sternites light yellow; hypopygium yellow. Male hypopygium with the caudal border of tergite produced into a narrow depressed-flattened blade, at apex split into two weakly divergent earlike lobes that are separated by a deep U-shaped notch; lobes virtually free from setae but with several microscopic punctures. Outer dististyle relatively long and narrow, the tip obtuse. Inner dististyle with the beak and outer part of the style very densely covered by a cushion of short erect spinous setae that are produced at tips into very long hairlike points; lower beak of style a low darkened flange that is produced into two spinous points, one at either end of the flange.

Holotype, ♂, Cameroun: Boopa, 9.iii.1931 (*J. A. Reis*).

Tipula (*Acutipula*) *auspicis* is most nearly related to *T.* (*A.*) *oryx* Alexander, which differs evidently in coloration and in all details of structure of the male hypopygium.

Pseudolimnophila exsul sp. n.

Allied to *frugi*; general coloration of mesonotal praescutum reddish brown, with three narrow brown stripes; pseudosutural foveae blackened, tuberculate pits pale; antennae relatively long, black, the base of the first flagellar segment yellow; halteres darkened, the base of stem yellow; legs brown, tarsi deepening into black; wings with a strong brownish tinge, very restrictedly patterned with darker brown, chiefly including the stigma and a cloud over the anterior cord; *Rs* in direct longitudinal alignment with R_5; *r-m* at or just before the fork of *Rs*; *m-cu* at from one-third to one-fifth the length of cell 1st M_2; anterior arculus preserved; abdomen with tergites brown, their posterior lateral borders obscure yellow, sternites uniformly yellow.

Female.—Length about 8·5 mm.; wing 9 mm.; antenna about 3 mm.

Rostrum blackened, sparsely pruinose; palpi black. Antennae (female) relatively long, as shown by the measurements, black throughout with the exception of the narrow yellow base of the first flagellar segment; outer flagellar segments long-cylindrical, the longest verticils subequal in length to the segments; terminal segment subequal to or longer than the penultimate. Head grey, more brownish grey on the central part of vertex; anterior vertex about twice the diameter of scape with an oval impressed median area.

Pronotum dark brownish grey. Mesonotum chiefly reddish brown, with three narrow but relatively distinct brown stripes, the central one most distinct; pseudosutural foveae long-oval, blackened; tuberculate pits much paler, reddened, placed close to cephalic border, separated from one another by a distance equal to about one-third their own diameter; scutal lobes and disk of scutellum weakly darkened; mediotergite extensively grey pruinose, the lateral and posterior portions more brownish yellow; pleurotergite darkened, its cephalic part paler. Pleura brown, the pteropleurite behind and the meral area more yellowed. Halteres dusky, base of stem yellow, knob dark brown. Legs with the coxae testaceous yellow, the fore pair a trifle darker; trochanters obscure yellow; remainder of legs brown, the femoral bases a little brighter; tarsi passing into black. Wings with a strong brownish tinge, very restrictedly patterned with darker brown, the latter including the stigma, a cloud over the anterior cord, and more restricted areas over the origin of *Rs*, posterior cord and outer end of cell 1*st* M_2; prearcular field more brownish yellow; veins brown. Venation: Sc_1 ending just beyond the fork of *Rs*, Sc_2 near its tip; R_2 and R_{2+3} subequal or the latter somewhat shorter; R_{2+3+4} rather strongly arcuate; *Rs* in direct longitudinal alignment with R_5, the basal section of the latter lacking; *r-m* at or immediately before the fork of *Rs*; cell 1*st* M_2 rectangular, parallel-sided, with *m-cu* at from one-third to one-fifth its length; vein 2*nd A* strongly arcuated near outer end; anterior arculus preserved.

Abdominal tergites brown, the posterior lateral borders of the segments obscure yellow; dorsopleural membrane darkened; sternites clear light yellow.

Holotype, ♀, Sudan: Outlaw's village, Boma Plateau, altitude 3700 ft., 20.ii.1939 (*J.G. Myers*); Collector's No. 10, 503.

By my key to the African species of *Pseudolimnophila* (1924, *Ark. Zool.* **16** (18): 4–7), the present fly runs to *frugi* (Bergroth), of South Africa, which appears to be the nearest described ally. The new form differs evidently in all details of coloration of the body, wings and legs, and in the details of venation. From the likewise allied *P. senex* Alexander, it differs in its smaller size and other characters.

Pseudolimnophila bisatrata sp. n.

Generally similar to *aurantiaca*; size medium (wing, female, 8 mm.); general coloration of mesonotal praescutum and scutum almost uniform light fulvous yellow, without distinct markings; head dark brown, pruinose; antennae with scape brownish yellow, sparsely

pruinose, pedicel brownish yellow ; pleural region yellow, on either side with two conspicuous subcircular black areas, one occupying most of the pleurotergite, the other much of the anepisternum ; knob of haltere darkened ; legs light brown ; wings with a strong fulvous brown tinge, the prearcular and costal fields a little darker ; stigma small, pale brown ; vein R_2 very faint ; veins R_3 and R_4 strongly divergent at tips ; *m-cu* just beyond the fork of M ; abdominal tergites dark brown, sternites obscure yellow.

Female.—Length about 8 mm. ; wing 8 mm.

Rostrum and palpi black. Antennae with scape light brownish yellow, sparsely pruinose ; pedicel brownish yellow ; flagellum broken. Head dark brown, pruinose.

Pronotum only moderately massive, brownish black in front, testaceous yellow behind. Mesonotal praescutum and scutum almost uniformly light fulvous yellow, without distinct markings ; praescutum with anterior end narrowed and slightly projecting ; scutellum slightly more infuscated ; mediotergite pale brown, pleurotergite chiefly occupied by a major subcircular black spot, its cephalic part yellow. Pleura light yellow, the anepisternum chiefly occupied by another black spot, a trifle smaller than the one on the pleurotergite ; dorsopleural membrane weakly brownish yellow. Halteres with stem yellow, knob darkened. Legs with the coxae and trochanters light yellow ; remainder of legs light brown. Wings with a strong fulvous brown tinge, the prearcular and costal fields a trifle darker ; stigma small, pale brown, only a little darker than the costal borders ; veins brownish yellow. Venation : Sc_1 ending shortly beyond fork of Rs, Sc_2 a little removed from its tip ; R_2 very faint, a trifle shorter than R_{2+3} ; veins R_3 and R_4 strongly divergent at tips so cell R_3 at margin is more extensive than cell R_2 and nearly five times cell R_4 ; *m-cu* just beyond fork of M ; anterior arculus preserved.

Abdominal tergites dark brown ; sternites obscure yellow. Valves of ovipositor elongate, horn-yellow.

Holotype, ♀, SUDAN-ETHIOPIA : Kende, Aloma Plateau, 13.xii.1938 (*J. G. Myers*) ; Collector's No. 10,223.

By my key to the African species of the genus (*loc. cit.* **16** (18) : 4–7) the present fly runs most nearly to *aurantaca* Alexander, of South Africa (Southern Rhodesia), which seems to be the closest described ally. The present insect differs from all generally similar species by the very conspicuous paired black spots on the sides of the thorax.

Trentepohlia (Trentepohlia) perpicturata sp. n.

General coloration yellow ; knobs of halteres darkened ; femora yellow, the tips paling to yellowish white ; wings whitish, with three brown crossbands, the most basal one narrow, the others very broad, variegated by spots of the ground colour ; abdomen bicoloured, dark brown, ringed with yellow, the subterminal segments uniformly blackened.

Female.—Length about 6 mm. ; wing 6 mm.

Rostrum and palpi black. Antennae black throughout, relatively elongate. Head chiefly dark in colour.

Thorax almost uniformly yellow, the pleura a trifle more darkened in the dorsopleural region. Halteres pale, the knobs darkened. Legs yellow, the femoral tips broadly but inconspicuously paling to yellowish white ; tibiae and tarsi dirty whitish. Wings with the ground colour whitened, the prearcular and costal portions more yellowish ; a heavy brown crossbanded pattern that is more extensive than the ground ; basal band narrow, lying shortly beyond the arculus, extending from R to the anal angle, including the outer half of cell 2*nd A*, slightly interrupted in cell *Cu* ; second band very broad, almost quadrate in outline, lying chiefly before the cord, extending completely across the wing but paler, in the cubital and anal fields, variegated by pale greyish areas in cell Sc_1, beyond vein Sc_2 on basal half of cell R_1 and near the outer end of cell R ; outer band subequal in extent to the last, involving the entire wing tip back to the level of the base of cell R_5, variegated by an extensive ground area in cell R_3 and a smaller one near the outer end of cell R_5 ;

veins pale yellow, darkened in the brown areas. Venation: *Rs* long, arcuated at origin, exceeding R_3 but shorter than R_4; veins R_{2+3+4} and R_{3+4} meeting at an angle at point of departure of R_2; *m-cu* shortly before the fork of *M*.

Abdomen bicoloured, dark brown, segments two to six, inclusive, with a conspicuous basal yellow ring that likewise involves the posterior border of the preceding sternite; subterminal segments uniformly blackened.

Holotype, ♀, CAMEROUN: Sakbayeme, 1.viii.1931 (*J. A. Reis*).

Trentepohlia (*Trentepohlia*) *perpicturata* is very different from the now numerous Ethiopian species of the subgenus. The pattern of the legs and especially the very heavy wing pattern readily suffice to separate the fly from all such allies.

Erioptera (Podoneura) malagasica sp. n.

Very similar to the type of the subgenus, *anthracogramma* (Bergroth), differing especially in the structure of the male hypopygium.

Male hypopygium with the outer dististyle blackened, nearly straight, the stem stout, terminating in a strong straight spine, with a smaller appressed lateral spine on outer face; outer surface of style in the vicinity of the lateral spine with a few microscopic denticles and sparse erect setulae. Inner dististyle shorter, at apex narrowed into a strong blackened spine. Gonapophysis appearing as a curved blackened horn. In *anthracogramma* the dististyles and gonapophyses are slightly different, especially the inner dististyle, which is broadly obtuse at apex.

Holotype, ♂ on microscope slide, MADAGASCAR: Vinanitelo.

Toxorhina (Toxorhina) taeniomera sp. n.

Size small (wing, male, less than 4 mm.); general coloration of body grey, the praescutum and scutum patterned with darker; rostrum, halteres and legs blackened; wings whitish subhyaline, unpatterned; veins brownish black, conspicuous; *m-cu* before the fork of *M*; abdomen, including hypopygium, uniformly dark brown; male hypopygium with the dististyle profoundly divided to form two separate arms or branches; aedeagus with the arms unusually long and slender, each exceeding the total length of the combined basistyle and dististyle.

Male.—Length, excluding rostrum, about 4 mm.; wing 3·8 mm.; rostrum about 2·6 mm.

Female.—Length, excluding rostrum, about 5·5 mm.; wing 4·5 mm.

Rostrum black, elongate, about two-thirds the length of wing. Antennae black throughout; flagellar segments oval to short-cylindrical. Head dark leaden grey, the broad anterior vertex more silvery grey.

Pronotum and cervical region brownish grey. Mesonotum grey, the praescutum with three poorly defined darker stripes that are confluent behind; scutal lobes similarly darkened. Pleura uniformly dark grey, including the dorsopleural membrane. Halteres brownish black, the base of stem restrictedly brightened. Legs with the coxae dark plumbeous grey; trochanters dark brown; remainder of legs brownish black, only the femoral bases a trifle more brightened. Wings whitish subhyaline, unpatterned; veins brownish black, conspicuous. Venation: Cell 1*st* M_2 large, *m* much shorter than the basal section of M_3; in one wing of type, cell 2*nd* M_2 with a short petiole to form an element M_{1+2+3}; *m-cu* in male almost its own length before the fork of *M*, in female much closer to this fork, the distance slightly variable.

Abdomen, including hypopygium, uniformly dark brown. Male hypopygium with the dististyle profoundly divided to form a second branch or inner style at base of the primary arm, the latter an elongate relatively slender blade, gradually narrowed to the oblique apex, on basal half of outer margin with a high flange; inner branch or style only about one-third the length of the primary one, appearing as a slender, gently curved rod. Aedea-

gus with the arms unusually long and slender, gradually narrowed and sinuous, the length of either arm exceeding the total combined length of the basistyle and dististyle.

Holotype, ♂, FRENCH EQUATORIAL AFRICA: Brazzaville, 2.ii.1938 (*J. A. Reis*). *Allotype*, ♀, CAMEROUN: Momjipome, 20.i.1938 (*J. A. Reis*).

The present fly is closest to *Toxorhina* (*Toxorhina*) *cisatlantica* Speiser, likewise from the Cameroun, which is still known to me only from the original description. This differs from the present fly in several important regards, as in the coloration of the body and legs, and in the whitened halteres. The elongate arms of the aedeagus seem to be a character of both of these flies.

Styringomyia subimmaculata sp. n.

Size small (wing, male, about 4 mm.); general coloration obscure yellow, without distinct pattern; legs obscure yellow, unpatterned, only the terminal tarsal segment black; wings greyish yellow, the dark pattern very restricted, best indicated by a darkening of the *r-m* crossvein; male hypopygium with the spine of the basistyle long and black, approximately twice the lobe; setae of outer dististyle three or four in number, very weak; ninth tergite a broad cushion with a further narrow median lobe on outer portion.

Male.—Length about 6·5 mm.; wing 4·1 mm.

Rostrum and palpi pale brown. Antennae pale yellow, the basal segments a trifle darker; verticils long and conspicuous, black. Head pale brown, with erect black bristles.

Thorax above chiefly obscure yellow, without distinct pattern. Pleura yellow. Halteres weakly infuscated. Legs with the coxae and trochanters yellow; remainder of legs obscure yellow, without distinct pattern on any of the segments, the terminal tarsal segment abruptly black. Wings pale greyish yellow, the prearcular field a little clearer yellow; no dark pattern excepting a vague cloud over *r-m*; veins yellow, *r-m*, fork of M_{1+2}, *m-cu* and the tip of vein *2nd A* a trifle darker. Venation: Cell *2nd* M_2 short-petiolate; *m-cu* about its own length beyond the fork of *M*; vein *2nd A* curved gently into the anal margin.

Abdomen pale brownish yellow, without distinct pattern; hypopygium yellow, with parts of the styli and phallosome blackened. Male hypopygium with the ninth tergite a broad cushion, clothed with abundant recurved spinous setae; median portion of cushion further produced into a narrow median lobe. Ninth sternite a narrow pale lobe that bears two stout blackened setae at apex. Basistyle with the terminal spine single, long and black, approximately twice as long as the lobe. Outer dististyle elongate, pale, the apex weakly darkened, bearing a single powerful seta at apex; setae along face of style weak, three or four in number. Middle dististyle much smaller than the inner one, bearing three concentrated groups of long peg-like spines, two of these marginal, the third placed lower on the face of style, all groups with about a dozen spines each. Inner dististyle a very large expanded blade, the outer apical angle produced into a slender arm that bears two strong spines; margin of style, beginning at base of this arm, with a row of long spinous setae, totalling about twenty, the more basal ones much more slender and weaker; apex of style laterad of the arm with a further close comb of about fifteen blackened spines; basal angle of style produced into a small acute point. Phallosome with the apex consisting of two blackened cultrate blades, the upper margin with a single strong spine.

Holotype, ♂, CAMEROUN: Momjipome, along stream, 20.1.1938 (*J. A. Reis*).

The present fly is readily distinguished from all other similar regional species by the virtually unpatterned legs, unusually restricted wing pattern, and the structure of the male hypopygium. In some respects it agrees with *Styringomyia impunctata* Edwards, of northern Nigeria, differing in the pattern of the legs, the venation, and in the structure of the hypopygium.

JACKSONIA PAPILLATA THEOBALD (HEMIPTERA, APHIDIDAE): A REDESCRIPTION WITH BIOLOGICAL AND TAXONOMIC NOTES.

By H. L. G. Stroyan.

Jacksonia papillata was first described by Theobald (1) in 1923 from apterae recorded under potato leaves at Swordale, Evanton, Ross-shire, by Miss D. J. Jackson. He repeated his description (2) in 1926, adding a further record from Doncaster on *Lysimachia nemorum* (Dallman). No further records of the species as such have been published; but in 1928 Laing (4) described *Myzus morisoni* from *Dactylis glomerata* at Newburgh, Aberdeenshire; and Hille Ris Lambers in 1935 (3), on examining the Theobald material, placed *morisoni* as a synonym of *papillata* Theobald, and the genus *Jacksonia* Theobald as a synonym of *Myzus* Passerini, 1860.

To this scanty history it is now possible to add some further details which not only compel a slight modification of Hille Ris Lambers' opinion (founded on the apterae which alone were known at the time) of the systematic position of the species, but also suggest a reason why the species has up to the present been so elusive and little known.

In February, 1949, the writer, while collecting at a spot near Hauxton, Cambs., was fortunate enough to stumble on a few overwintered viviparae of *Metopolophium frisicum* H. R. L., and with the intention of setting up a culture, several plants of *Poa pratensis* were dug up and transferred to the laboratory.

On 14th March, while one pot of grass was being examined for *Metopolophium*, an alate aphid was seen crawling up a blade, and as it was patently neither a *Metopolophium* nor *Rhopalosiphum padi* (L.), which was also known to be present on the same plant, a further search was made which resulted ultimately in the finding of about a dozen apterae and one more alata.

On examination it became apparent that the apterae were unmistakably *Jacksonia papillata* Theobald, and the alatae, though rather different in appearance, were clearly the same species.

The following notes and descriptions have been made from the material now available:

Apterous viviparous female.

Colour.—Body brownish- or sometimes slightly greenish-ochreous; ventral surface of metathorax and first two or three abdominal segments usually with some slight whitish pulverulence, chiefly intersegmentally but extending in small areas on to the middle of the segments. Head, antennae and legs rather uniformly testaceous brown; eyes black; siphunculi colour of body, dark at extreme apex; cauda dark, hidden under 8th tergite; rostrum dark at extreme apex of last joint.

Microscopic morphology.—Body plump oval, convex dorsally. Entire body cuticle strongly and scabrously rugose, this texture giving place on the head to the scabrous spinules typical of the genus *Myzus* Passerini, albeit rather more pronounced than in typical

members of the genus. The texture of the pronotal cuticle is intermediate between the head and body types of sculpture. The whole cuticle has a yellowish tinge. Head pale testaceous brown; frontal tubercles strongly developed and convergent as in *Myzus* Passerini (s.s.); occipital region convex, with no trace of spinal tubercles. Compound eyes normal, triommatidion fairly large (but not abnormal as stated by Theobald). The whole of the frontal tubercles and antennal joints I and II are covered with scabrous rugosities and imbrications; the remaining joints of the antennae exhibit the same structure in a diminishing degree from base to apex, the imbrications becoming progressively more normal on IV and V to completely normal on VI. The cephalic hairs are very short, blunt and hard to find, being dwarfed by the very strong cuticular scabrosities. There are two pairs on the occipital region and apparently two on each frontal tubercle.[1] The antennal hairs are somewhat more easily seen, though still (on ant. III) smaller than the imbrications, and not longer than one-quarter of the greatest diameter of the joint. Rostrum reaching second coxae, apical joint normal, straight-sided, with extreme apex black sclerotic. The thorax and abdomen are without ornamentation except for an ill-defined oval area of slight pigmentation between the siphunculi, whose sculpturation is of the spinulose cephalic type rather than the corrugated body type.

The stigmata are reniform, those of the metathorax and first abdominal segment are closely approximated to each other.

Siphunculi rather short, slender, tapering from base to about half their length, thereafter somewhat gradually dilated to apex; scabrously imbricate throughout, apex without any flange and obliquely truncate, operculum with a rather small porus; colour slightly darker than that of body cuticle; length about equal to antennal joint V; in some specimens the siphunculi are slightly curved inwards. Cauda short, slightly constricted at base, somewhat dark sclerotic, in shape something like that of *Sappaphis* Matsumura; about half as long as siphunculi, with 4 to 6 fine hairs arranged in pairs on the apical half. The dorsal abdominal hairs are very short and blunt, like the cephalic ones, and inconspicuous under a low-power objective. The ventral body cuticle is rather regularly ornamented around the midline with transverse lines of spinulose imbrication, except on the meso- and metathorax, which are irregularly and confusedly rugose between the coxae. These latter are encircled by more regular spinulose sculpture of the abdominal type; the pleural areas of both thorax and abdomen show a progressively more irregular imbrication passing gradually laterally into the confused rugosity of the dorsum. The ventral body hairs are somewhat longer than the dorsal hairs, and acute at the apices. The antennae and legs are uniformly brown sclerotic, the second tarsal joints slightly darker. The tibial hairs are short, about three-quarters the apical diameter of the tibiae, semi-recumbent; the chaetotaxy of the first tarsal joints is 3 : 3 : 2.

In all the specimens seen so far the occipital convexity of the head previously mentioned is incompletely divided from posteriorly by a median sulcus into two distinct posterolateral prominences.

Measurements of Specimens.

Body.	Ant.	Siph.	Cauda.	Caudal hairs.	Ap. jt. rost.	Ant. hairs.	Ant. joint ratios (joints III–VI).
1·63	0·94	0·18	0·10	4	0·11	0·006	17 : 12 : 10 : 7 + 13
1·81	0·95	0·18	0·10	6	0·10	0·006	17 : 12½ : 10 : 7 + 13
1·76	0·98	0·18	0·10	5	0·10	0·009	18 : 12 : 10½ : 7½ + 13
1·79	0·98	0·18	0·10	4	0·10	0·008	17½ : 12 : 10½ : 7½ + 13½
1·86	0·94	0·17	0·10	4	0·10	0·008	17½ : 11 : 10 : 7 + 13
1·66	0·88	0·18	0·10	4	0·10	0·006	15 : 11½ : 9½ : 7 + 12

[1] Probably there are the same number as in the alata in reality, but this is obscured by their small size compared with the cuticular rugosities.

All measurements of length are in mm. correct to ·01 or (for antennal hairs) ·001. Antennae are measured without joints I and II. Antennal hair length represents the length of the longest measurable hair on ant. III.

Footnote to apt. viv. female.—The VIIIth abdominal tergite is closely and regularly imbricate rather than spinulose, and bears medially, just in front of the base of the cauda, a transverse slit-like aperture or scar about ·025 mm. in length and resembling the orifice of a gland. Similar structures are visible on careful examination in other species, but in *papillata* Theobald the organ (?) is unusually prominent.

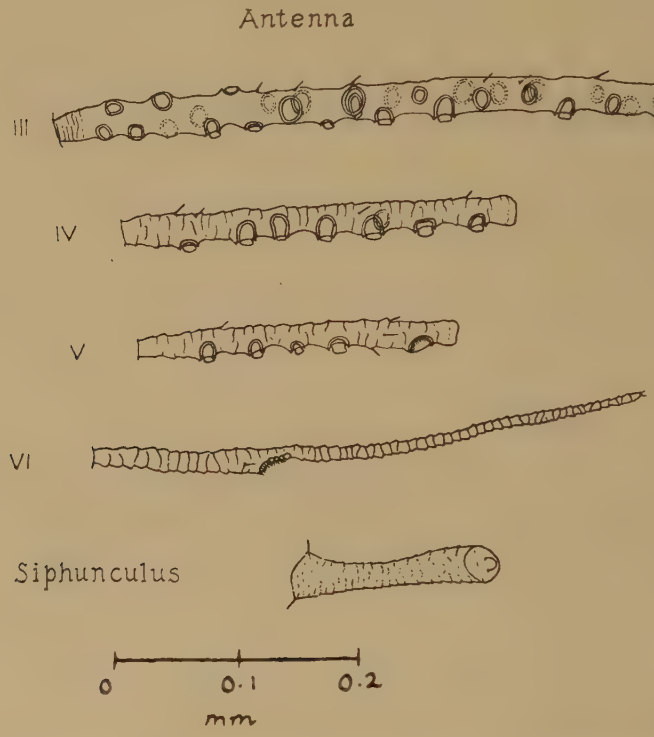

Fig. 1.—Siphunculus and antennal joints of the alate viviparous female of *Jacksonia papillata* Theobald.

Alate Viviparous Female.

Colour.—Medium to dark green ; head and thorax deep black ; abdomen with blackish marginal sclerites on 2 to 4 inclusive, transverse black bars on 1 and 2 and a large black area on the dorsum of 3 to 6 inclusive ; a transverse oval sclerite on 7 and a somewhat more transverse and broken-up bar on 8. More or less coalescing pleuro-sternal areas of darkish pigmentation present on the ventral surface of abd. 3 to 6 inclusive. Legs and antennae dusky, ant. III, apical half of femora, apices of tibiae and all tarsi rather darker. Siphunculi and cauda dusky. The general appearance is of a rather dark green and heavily pigmented insect. Wings when fresh pale greyish, with blackish veins.

Microscopic morphology.—Body form typical for alatae of *Myzus* ; somewhat larger than apterous female. Wings ample, second fork of median deep, as long as or longer than its common stem from first fork. Head deep black sclerotic, frontal tubercles well developed

and rugose, remainder of dorsal cuticle sparsely spinulose. Cephalic hairs well marked, much longer than in apterae, about ·016 mm. long, apices acute. Each frontal tubercle bears 6 hairs directed laterad, there is one on each side between the tubercle and the median stemma, and there are 5 pairs on the post-frontal and occipital region. The antennae are of moderate length, rather shorter than the body ; joints I and II are rather rugose internally, joint I also being a little produced on its inner face, and both joints are black sclerotic ; joint III is also black, though not as dark as I and II ; joints IV to VI inclusive are rather paler in both specimens seen so far, an unusual feature, with a small darker area round each primary rhinarium. Joint III is not at all imbricate except at the extreme base ; IV to VI show normal imbrication increasing in intensity to the apex of the processus terminalis. The secondary rhinaria are irregular in size and shape, rather tuberculate and with a protruding plaque, and are sparsely distributed all along joints III to V inclusive, with no tendency to form regular rows on III. The antennal hairs are rather long and fine on I and II, shorter but still acute on the other joints, those on III about half as long as the basal diameter of the joint. The abdominal dorsum is membranous with very slight, hardly visible irregular rugosities between the sclerites, except on VII and VIII which are more regularly ornamented with transverse rows of small spinules. The sclerites, whose distribution has already been indicated in the colour notes, are also sparsely and rather irregularly spinulose ; the large area on 3 to 6 represents the combined transverse sclerites of those segments, and shows lines of weakness along the intersegments. Well marked transverse series of darkly pigmented " Muskelplatten " are present along intersegments 0/1 to 2/3 ; the " Muskelplatten " of the other intersegments are paler and inconspicuous against the large mid-dorsal sclerotic area. The spinal body hairs are short (·007 mm.) and blunt, except on the 8th tergite, where they are longer (·016 mm.) and acute, and in the two known specimens 2 and 3 in number respectively ; probably the typical variation is between 2 and 4. The siphunculi are similar to those of the apterae, but darker, and with the narrowest portion a little before the middle, and the imbrications a little less pronounced. The cauda is elongate triangular, about three-quarters as long as the siphunculi, darkish sclerotic, with 5 or 6 hairs in pairs on the apical half. The whole mid-ventral cuticle from abd. 1 to just before the genital plate is finely, regularly and closely ornamented with transverse rows of spinules, which are particularly marked on the pleural pigmented areas, but become sparser and more irregular lateral to these. The genital plate is ornamented with much shorter transverse rows, each consisting of only 4 or 5 spinules. The ventral body hairs are acute and up to about ·030 mm. long ; those on the posterior border of the genital plate are very short, acute and inconspicuous, and few in number. There are three rudimentary gonapophyses, which bear rather longer, acute and spiny hairs, about ·013 mm. long. The rostrum is proportionately shorter than in the apterae, and does not reach the second coxae. The legs are dusky sclerotic with darker tarsi, femoral apices and tibial apices ; rather slender and with tibial hairs as in apterae.

Measurements of two specimens.—(1) Body 2·24 mm., antenna without joints I and II 1·70 mm., siphunculus 0·18 mm., cauda 0·13 mm., caudal hairs 5, antennal joint ratios (III to VI) 35 : 21 : 19 : 11 + 20, secondary rhinaria on left antenna 21/8/2, on right 20/7/1.

(2) Body 2·14 mm., antennae without joints I and II, 1·65 mm., siphunculus 0·17 mm., cauda 0·12 mm., caudal hairs 6, antennal joint ratios 34 : 21 : 17 : 11 + 20, secondary rhinaria on left antenna 27/11/2, on right 30/8/4. Tarsal chaetotaxy of both specimens 3 : 3 : 2.

Biology.

All the apterae found were feeding very low down on the colourless basal portions of the stems of *Poa pratensis*, where they were effectively concealed from all but the most searching scrutiny, their colour harmonizing well with the pale brown of the withered blades mingled with the living stems. That

this choice of habitat is deliberate was shown by the behaviour of apterae transferred to another plant of *Poa* ; these refused to show any interest in the green upper portions of the blades, and without hesitation walked down the blades and stems to the extreme base before beginning to probe with the rostrum.

These habits conflict rather markedly with the account given by Theobald of the food preferences and habitat of *J. papillata* (i.e. under the leaves of potato and on the leaves of *Lysimachia nemorum*). The food-plant given by Laing for *Myzus morisoni* (*Dactylis glomerata*), however, fits in well with the graminivorous habit observed in *papillata* by the writer. It is certain that in fact *papillata* Theobald is a grass feeder exclusively, and that the absence of recent records of the species must be put down partially to ignorance of its true host relationship and partially to its cryptic habits. The discrepancies in the Theobald account fall into a rather truer perspective if it is remembered that Miss D. J. Jackson was also said by Theobald to have discovered the truly graminivorous *Hyalopteroides pallida* Theobald (? = *dactylidis* Hayhurst) on potato also at Swordale in Ross-shire, which casts a certain amount of doubt on Miss Jackson's host plant records ; and that *Lysimachia nemorum*, recorded as a host by Dallman, is a creeping plant which was quite probably in this case growing intermingled with grass, from which the aphids may have been transferred by the disturbance attendant on the collector's activities.

Systematic Position.

The genus *Jacksonia* Theobald is most nearly related in a morphological sense to *Myzus* Passerini s.s., as all three previous authors who have mentioned the species *papillata* Theobald have concluded. The apterae, which alone have been known hitherto, can only be separated from *Myzus* on the siphuncular structure, the cuticular sculpturing only differing in degree from that genus ; so that it was natural for Hille Ris Lambers to reject a genus based on this one character and described from apterae only.

The discovery of alatae, however, has provided another strongly marked character for the separation of *Jacksonia* from *Myzus*, in the very large, irregular and protuberant secondary rhinaria. Their distribution over III, IV and V is not diagnostic, since the same distribution is found in the subgenus *Prunomyzus* Lambers and Rogerson and in many alatae of *Myzus ascalonicus* Doncaster ; but their structure and the general facies of the antenna in *papillata* Theobald leave little doubt that the species is worthy of generic rank. The generic definition is as follows :

Jacksonia Theobald, 1923.

In nearly all respects similar to *Myzus* Passerini, 1860, s.s.

Head with strongly developed rugose frontal tubercles. Body cuticle of apterae strongly rugose or scabrous, not darkly pigmented. Secondary rhinaria absent in apterae, in alatae large, irregular in size and shape and with a strongly protuberant plaque ; often occupying the whole width of the antennal joints ; distributed over joints III to V inclusive, with little or no tendency to a regular seriate arrangement. Siphunculi short and slender, somewhat dilated at base and apex in genotype, without any terminal flange, obliquely truncate with a distensible membranous operculum. Chaetotaxy of first tarsal joints 3 : 3 : 2. On GRAMINEAE, holocyclic.

Genotype *Jacksonia papillata* Theobald, 1923 (monotypic).

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The author is also indebted to Dr. Hille Ris Lambers, who in a discussion confirmed the findings described in this paper and advised that they should be published in their present form.

NOTE.—Since this paper was accepted for publication Dr. C. S. Wood-Baker has kindly sent me some further colour notes based on material in his possession, indicating the existence of some colour forms of which I have not seen any specimens, shading from wine-yellow through olive to dark wine-brown or wine-red in apterae, and dark brown in alatae. The antennal measurements and rhinarial numbers described by Dr. Wood-Baker for his alatae agree well with those of my specimens, the rhinaria on III varying from 22 to 29, on IV from 9 to 13 and on V from 2 to 6.

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